## CLAIMS

What is claimed is:

1. A sensor assembly comprising:

a hollow torque-shaft including a first non-contact sensor component mounted to an outer surface;

a thrust shaft at least partially received within said hollow torque-shaft and including at least one translation member that converts a driving in-line thrust force applied to said thrust shaft into a twisting force applied to said hollow torque-shaft and said first non-contact sensor component; and

a second non-contact sensor component supported by a non-rotating structure and cooperating with said first non-contact sensor component to measure said thrust force.

2. The sensor assembly of claim 1 wherein said first non-contact sensor component comprises a magnetoelastic element and said second non-contact sensor component comprises a magnetometer, said magnetoelastic element generating a magnetic response representative of said twisting force with said magnetometer providing an electrical signal interface for said magnetic response.

3. The sensor assembly of claim 1 including an electronic control unit generating control signals for a system component wherein said first and second non-contact sensor components cooperate to generate a feedback control signal that is transmitted to said electronic control unit.

4. The sensor assembly of claim 3 wherein said system component comprises a rotary machine component.

5. The sensor assembly of claim 3 wherein said system component comprises a static machine component.

6. The sensor assembly of claim 3 wherein said system component comprises a vehicle component.

7. The sensor assembly of claim 1 wherein said at least one translation member comprises at least one first member formed on an outer surface of said thrust shaft and wherein said hollow torque-shaft includes at least one corresponding second member formed on an inner surface of said hollow torque-shaft, said first and second members cooperating to translate said thrust force into said twisting force.

8. The sensor assembly of claim 7 wherein said at least one first member comprises a plurality of curved recesses formed about the circumference of the outer diameter of said thrust shaft and said at least one second member comprises a plurality of projections formed about the circumference of the inner diameter of said hollow torque-shaft with each one of said projections being received within a corresponding one of said recesses.

9. The sensor assembly of claim 1 including a locking mechanism having a first lock component supported by said thrust shaft and a second lock component supported by said hollow torque-shaft wherein said first and second lock components cooperate to lock said thrust shaft and said hollow torque-shaft together for rotation about a common axis.

10. The sensor assembly of claim 9 wherein said first lock component comprises a plurality of keys formed about the outer circumference of said thrust shaft and said second lock component comprises a plurality of keyways formed about the inner circumference of said hollow torque-shaft with each one of said keys being received within a corresponding one of said keyways.

11. The sensor assembly of claim 10 wherein the length of said keyways is greater than the length of said keys to permit a predetermined amount of axial movement between said thrust shaft and said hollow torque-shaft.

12. The sensor assembly of claim 9 including a thrust bearing mounted between said hollow torque-shaft and said non-rotating structure to permit said hollow torque-shaft and said thrust shaft to freely rotate relative to said non-rotating structure.

13. The sensor assembly of claim 12 wherein said hollow torque-shaft includes a mounting flange for supporting a thrust bearing race.

14. A sensor assembly comprising:

a hollow torque-shaft including a magnetoelastic element surrounding an outer circumference of said hollow torque shaft;

a thrust shaft at least partially received within said hollow torque-shaft;

a locking component having a first lock member supported by said hollow torque-shaft and a second lock member supported by said thrust shaft, said first and second lock members cooperating to lock said thrust shaft and said hollow torque-shaft together for rotation about a common axis;

a translation component having a first translation member supported by said hollow torque-shaft and a second translation member supported by said thrust shaft, said first and second translation members cooperating to convert a driving in-line thrust force applied to said thrust shaft into a twisting force applied to said hollow torque-shaft and said magnetoelastic element; and

a magnetometer supported by a non-rotating structure and cooperating with said magnetoelastic element to measure the amount of said twisting force generated by said thrust force.

15. The assembly of claim 14 wherein said first translation member comprises a plurality of projections formed about the circumference of the inner diameter of said hollow torque-shaft and said second translation member comprises a plurality of curved recesses formed about the circumference of the outer diameter of said thrust shaft with each one of said projections being received within a corresponding one of said recesses to translate said thrust force applied to said thrust shaft into said twisting force applied to said hollow torque-shaft.

16. The assembly of claim 14 wherein said first lock member comprises a plurality of keyways formed about the inner circumference of said hollow torque-shaft and said second lock member comprises a plurality of keys formed about the outer circumference of said thrust shaft with each one of said keys being received within a corresponding one of said keyways.

17. The sensor assembly of claim 16 wherein the length of said keyways is greater than the length of said keys to permit a predetermined amount of axial movement between said thrust shaft and said hollow torque-shaft.

18. A method for measuring thrust force comprising the steps of:

(a) applying an in-line driving thrust force to a thrust shaft;

(b) translating the in-line driving thrust force into a torque;

(c) applying the toque to a hollow torque-shaft; and

(d) measuring the torque with a non-contact sensor assembly to determine the thrust force.

19. The method of claim 18 including the steps of inserting the thrust shaft at least partially within the hollow torque-shaft and locking the thrust shaft and hollow torque-shaft together for rotation about a common axis.

20. The method of claim 19 including the steps of mounting a magnetoelastic element about an outer circumference of the hollow torque-shaft, mounting a magnetometer to a non-rotating structure with the magnetoelastic element and magnetometer cooperating to form the non-contact sensor assembly, generating a magnetic response representative of the torque with the magnetoelastic element, and providing an electrical signal interface for the magnetic response with the magnetometer.